User Experience Guidelines

Livescribe™ Platform SDK
Version 1.2.0

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Preface

About this Document

This guide presents user interface guidelines for creating penlets to ensure a consistent user experience across all smartpen applications.

About the Platform SDK Documentation Set

The Livescribe Platform SDK documentation set includes the following documents.

Introductory Documentation:

- *Read Me First*: introduces the components of the Livescribe Platform, lists system requirements, and provides download instructions.
- *Livescribe Developer License Agreement:* The Livescribe license agreement for third-party developers, in TXT and PDF formats. All developers must accept this agreement before downloading the Platform SDK.
- *Introduction to the Livescribe Platform:* describes the Livescribe Platform, the Pulse smartpen and Livescribe dot paper, and Pulse smartpen applications.
- *README.txt:* provides a quick overview of how to set up your development environment. It is aimed at experienced developers and presents information with minimal context. For full instructions, see *Getting Started with the Livescribe Platform SDK* instead.
- *Getting Started with Livescribe Platform SDK*: describes the contents of the SDK, how to set up your IDE (Integrated Development Environment), and how to create some simple Hello World penlets. It also provides a reference for the wizards, views, and dialogs of the Penlet perspective within the IDE.
- *Eclipse Help:* basic coverage of the Livescribe IDE plug-in with Eclipse.
- *Release Notes:* covers late-breaking information, fixed bugs, and known issues.
- *Glossary:* terms and definitions (located in *Getting Started with the Livescribe Platform SDK*).

Penlet Development Documentation:

- *Developing Penlets*: the primary programming guide for open paper (OP) and fixed print (FP) penlet development.
- *Livescribe Platform API javadoc*: API reference for packages, classes, and methods.
- *(This Document) User Experience Guidelines*.
- *Development Guidelines:* presents guidelines for creating penlets and paper products that conform to Livescribe standards and legal requirements.

Paper Product Development Documentation:

- *Developing Paper Products:* introduces the Livescribe Paper Designer and processes for designing paper products for the Pulse smartpen.

End-User Documentation

To learn about the Pulse Smartpen and Livescribe Desktop from a user's perspective, please consult their user guides. They are available at http://www.livescribe.com. Click on the Support button and locate the Documents list in the right-hand column. Links to the following documents in PDF format are available:

- *Getting Started*: introduces the Pulse Smartpen. A dot-enabled version of this document is included in the Pulse Smartpen box.
- *Pulse Smartpen User Manual*: explains Pulse Smartpen features and use.
- *Livescribe Desktop User Manuals for Mac OS X and Windows*: explain Livescribe Desktop features and use.

User Experience Guidelines

This section presents guidelines for designing a consistent user experience. Livescribe follows these guidelines for applications we develop in-house, such as Paper Replay, Paper Piano, and others.

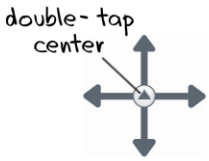
Using the Menu

The Pulse smartpen uses a flat 2D model for its menu system. The model is essentially a tree-like structure of menu items with submenu items. The best way to understand this model is to use the Nav Plus paper control to activate the Main Menu on your Pulse smartpen. Then, experiment using the record and playback features of Paper Replay. Refer to the Paper Replay section of the *Pulse Smartpen User Manual* for detailed instructions on navigating using the Nav Plus.

There are several basic Nav Plus actions reserved to control menus and applications:

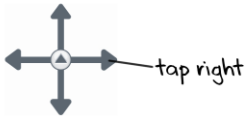
- Double Tap Center
- Right Tap
- Left Tap
- Up Tap
- Down Tap

Double Tap Center



Double tapping on the center of the Nav Plus returns the display to the Main Menu. Double tapping also stops most applications that are currently running. The main exception is Paper Replay, which goes into background recording mode if recording was in progress prior to double tapping the center of the Nav Plus.

Right Tap



Right tapping on the Nav Plus performs one of the following actions, depending on the application and its menu structure:

- Slides the display text to the left to reveal a submenu. For example, right tapping on the Paper Replay application menu will slide the menu to the Record Session submenu.
- Slides the display text to the left to show the first item in a selectable list. For example, right tapping on the Play Sessions function of Paper Replay will slide the menu to show the first in a series of recorded sessions.
- Starts an application or one of its functions. For example, right tapping when Record Session is on the display will start recording and display an audio timeline. Similarly, right tapping when Time is on the display will run that application and display the time.
- Right tapping can select an item that is on the display. For example, in Play Session mode, right tapping on a displayed session will select it and start playing it.
- Confirm a command. Applications should consider right tapping as a Yes response from the user. For example, right tapping when "Delete this session?" is on the display will delete the session and slide the text to the left to display a confirmation message such as "Session Deleted".

Left Tap

- Left tapping on the Nav Plus slides the display text to the right to return to the parent menu. For example, left-tapping when the Record Session submenu is on the display will slide the menu to show Paper Replay on the main menu.
- If the application or one of its functions is running, left tapping out to the Main Menu exits the application or function.
- Cancel a command. Applications should consider left tapping as a No response from the user. For example, left tapping when "Delete this session?" is on the display will not delete the session and slides the text to the right to show the parent function or application.

Up Tap and Down Tap

Up tapping and down tapping on the Nav Plus scrolls through a list of menu items that are at the same level, such as Record Session, Play Session, and Delete Session for Paper Replay. You can also use up and down tapping to scroll a list of items, such as a list of Paper Replay sessions that are available to play or delete. Menus and lists do not wrap. On reaching the top or bottom of a menu, the display shows a bracket in place of the scroll arrow. Continued attempts to move in that direction play a "can't do that" audio instruction.

Standardized Menu Structure

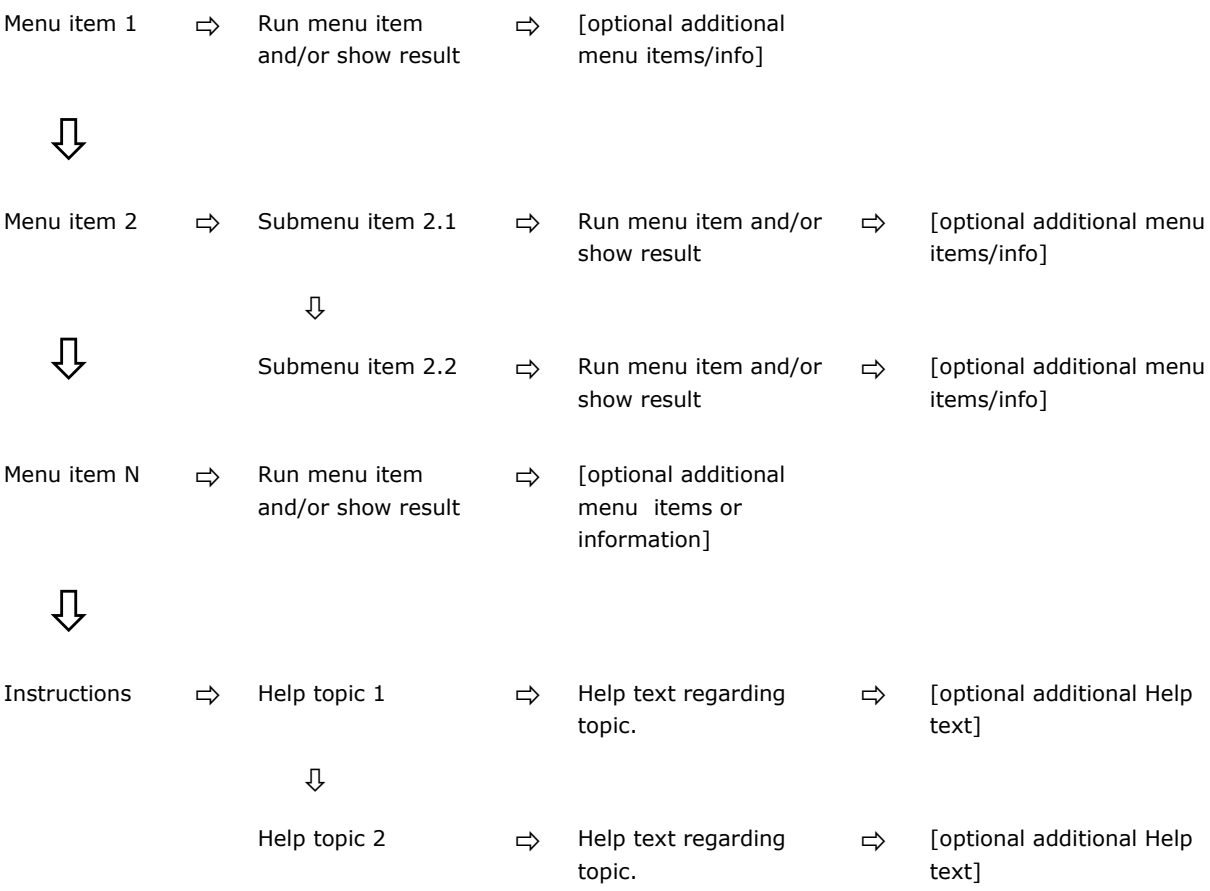
The primary way users interact with a smartpen application is through its menu system. Whether simple or complex, the menu system should adhere to certain standards defined by Livescribe. A standardized approach to menu design will ensure a consistent user experience and make applications easier to learn and use.

When designing your application's menus, please observe the following rules:

- Related items (such as top-level menu items, related commands, selectable options, and so on) should be organized in a vertical menu structure.
- Actions on a specific menu item should be organized in a horizontal menu structure.
- Quizzes and tests should be grouped under their own top-level menu item within the application.
- Tapping left should return the user to the previous item in the horizontal menu. Ultimately, the user can exit the application by tapping left enough times.
- Tapping right should move the user to the next item in the horizontal menu. Depending on the application, this may run a command, display information, or display sub-menu item.
- Tapping down should move the user to the next item in the vertical menu.
- Tapping up should return the user to the previous item in the vertical menu.
- All applications should have a Help or Instructions menu item that explains how to use the application or directs users to other resources, such as a URL to an online video or documentation.
- Recommended: Applications should have voice instructions that accompany the written text instructions.

The following diagram illustrates a standard menu structure for a smartpen application. Arrows in the diagram correspond to Nav Plus navigation by the user. For example, the ⇨ symbol indicates a right tap on a Nav Plus, and the ⇩ symbol indicates a down tap on a Nav Plus.

Application Menu


Menu item 1
Run menu item and/or show result
[optional additional menu items/info]
Menu item 2
Submenu item 2.1
Run menu item and/or show result
[optional additional menu items/info]
Submenu item 2.2
Run menu item and/or show result
[optional additional menu items/info]
Menu item N
Run menu item and/or show result
[optional additional menu items or information]
Instructions
Help topic 1
Help text regarding topic.
[optional additional Help text]
Help topic 2
Help text regarding topic.
[optional additional Help text]

Let's take as an example, the menu structure of the Video Poker game. It is simple and follows Livescribe standards:

Video Poker

Start New Game ⇨ Starts a new game.

⇩

Instructions ⇨ Displays scrolling instructions

⇩

Hand Values ⇨ Displays poker hand 1 and values.

⇩

Displays poker hand 2 and values.

⇩

Displays poker hand N and values.

Horizontal Scroll Speed

If text is too long to be displayed all at once on the OLED, it scrolls to display the unseen characters. The speed at which text scrolls horizontally is a system setting. The user selects it to suit their needs or taste. Your application cannot modify the scroll speed. When designing applications, keep in mind that the user may have selected a speed slower or faster than the one you are using on your own smartpen.

Display Area

The size of the Pulse smartpen display is 96 pixels wide by 18 pixels high. Your application can write to the full display. However, the system may use some of the

space to show system status. The space reserved for status is the System Tray. Its dimensions are 6 pixels wide x 18 pixels high, always on the right of the display.

An example of the System Tray is when in you are recording in Paper Replay and go back to the Main Menu to run another command, such as Time. Paper Replay continues to record in background mode. However, instead of showing the usual audio timeline, the System Tray displays a flashing dot. The System Tray also displays system warnings, such as low battery and low memory icons.

Prompt and Believe

For some applications, Livescribe uses a protocol called Prompt and Believe. This protocol is for an application that prompts a user for a specific input but does not analyze or confirm the actual input. Instead, the application assumes (or believes) that the user entered the proper value.

For example, an application might prompt a user to create a circle and put a letter "r" in it to create a "Reminder" button. Instead of using character recognition to determine that users actually enter an "r", the application trusts that they always do. The application simply notes the area the user wrote in and assigns the entire bounding area of their strokes to the "Reminder" function. The user can write a circled "r" as directed, or could write the word "Reminder" or draw a picture of a finger with a string tied around it. From then on, the application treats whatever the user drew as the button and invokes the proper code when the user subsequently taps on it.

Prompt and Believe allows for flexibility and creativity for the user. However, we've found that it helps when the instructions suggest something for the user to draw. When the directions are completely open (e.g., "Draw a control"), sometimes users worry about getting it wrong. It's similar to the old "press any key" instruction on desktop computers, which had to be replaced because nervous users sat staring at their keyboards, looking for a key labeled "Any." We recommend language such as "Draw your 'Reminder' button, and then double tap." This tells users what the button will be used for, and also gives some suggestion as to how to label it.

Providing Instructions

Livescribe applications communicate instructions to users as text and audio. You should *always* provide text instructions on the OLED display. Audio instruction may

also be added, if you desire. Text instructions are mandatory because users may choose to mute their Pulse smartpen or disable audio instructions. All instructions need to be complete. Text and audio instructions do not need to be identical, but they each need to provide all the information a user needs to know to use the application or complete a specific command.

The OLED Should Never Be Blank

A smartpen application must *never* display a blank screen. The OLED should always display some pertinent information to the user about the currently running application.

For example, imagine that your application gives full audio instructions to the user for the current action, but you don't want to repeat the instructions onscreen. In that case, the OLED should display some brief but useful information. For instance, if your application is State Capitals and you provide an audio hint after 5 seconds of inactivity from the user, the OLED should at least display *Hint* or *Tip*.

Audio Punctuation Marks

The system also uses audio punctuation marks (APMs) to convey success or failure of a command. APMs also indicate transitions from one state to another or from one menu to another. APMs are usually short beeps or chimes. You can use APMs in your application as well.

Acknowledge OK	User selected the OK action. Often used in confirmation ("are you sure?") messages to user. The right arrow of Nav Plus is normally considered the OK button in a confirmation.
Cancel	User selected the Cancel action. Often used in confirmation ("are you sure?") messages to user. The left arrow of Nav Plus is normally considered the Cancel button in a confirmation.
Action not available	User attempted an action she might reasonably expect to work. Used when required resources (such as data files associated with an application) are not available.
User Selection	User selects an item from a menu.
End of menu	User tried to advance beyond the top- or bottom-most item of a menu.

Scroll down in Nav Plus	User tapped the down arrow of a Nav Plus.
Scroll up in Nav Plus	User tapped the up arrow of a Nav Plus.

Termination Events

Termination Events (TEs) are notifications from users that they are finished responding. Whenever a user is prompted for input by a smartpen application, a TE is how the user signifies that they are through writing or drawing their input and are ready to proceed. The most common forms of TEs are:

- Timeout
- Double-tap on Open Paper
- Special characters

In general, we recommend that applications allow for both timeout and double-tap TEs whenever possible. However, certain TE types can be excluded when they are likely to cause confusion to the user.

Timeout

Timeout assumes the user is finished responding when there is no smartpen activity on paper for a certain timeout period. The recommended default timeout is one second. However, some applications might want a longer timeout setting.

Example: In the Piano application, the user is prompted with "Write the letter 'I'. This is your instrument icon." Once the user begins writing on OP, a pause of one second constitutes a TE, and the application then moves on to the next request. Whatever the user has drawn before the timeout will be used as the instrument icon going forward.

There are times when a timeout TE are not appropriate. Think about your user's state of mind and the typical activities they may be engaged in while using your application or function. For example, in QuickCalc, when the user is entering a math problem, the timeout TE is not used. This is because it's easy to imagine that a user

might need to pause to find the numbers they want to use in their mathematical expression. If a user is adding up receipts, they might even be setting down the pen between each number. So in this case, other TEs are accepted for finalizing the entry of the expression, but a timeout is not used.

Double Tap on Open Paper

Another way for users to indicate they have finished responding is for them to double-tap on Open Paper. You can design your application to instruct users to double-tap somewhere on Open Paper when they have finished writing.

This is the most common of the TEs, and it should be included wherever possible. Users will get used to using double-tap to finish their entry and move quickly on to the next step.

Special Characters

You can also have the application look for special characters that indicate the user has finished entering data. For example, the Calc Quick Command application assumes the user has finished entering numbers when the user writes "=" (the equals sign). Use special character TEs only where users could easily be confused were the option not available.

Special characters are specific to an application or situation, and are included where they align with how a user might reasonably expect an application to work.

Application Deactivation

Once started, Livescribe applications continue to run. Instead of terminating, applications change from an active state to an inactive state. For example, when a user changes from one application to another, the first application is deactivated and the second one is activated if it is already running, or started if not. Application switching is the most common cause for an application to deactivate. However, there are other cases as well. When designing your application, you should consider these cases and program the proper response:

Application switching	The current application deactivates because the system switched to another application.
Notes Mode	The current application deactivates because the user switched to Notes Mode. Notes Mode is when users write on Open Paper and are not running Paper Replay or another application that uses Open Paper.
Self deactivation	The current application deactivates because the application changed its own state.
System shutdown	The current application deactivates because the system is shutting down.
System event	The current application deactivates because of a system event.

One-Second Deactivation

Due to the nature of Livescribe smartpen computing, applications must respond to user input immediately. When a user switches to another application, the current application must deactivate in ***one second or less*****.** Unlike a PC application, which normally asks tidying-up questions such as whether files or settings should be saved, a smartpen application must not ask for any input from the user before exiting.

Data on Display

Some applications write data to the display. For example, a calculator application displays the results of a calculation. For this kind of application, it is important to keep the results on the display for a long enough time so the user can write down the results. The issue is that when users start writing down the results, the Pulse smartpen switches to the default Notes Mode. Notes Mode will change the display to the default screen and erase the displayed calculator results. To prevent this from happening prematurely, the calculator application uses the Data on Display feature to delay showing the default display after calculating a result.

Background Recording

Paper Replay can record in background mode. This allows users to start recording a Paper Replay session and then start or switch to another application. When they do this, recording continues. The Pulse smartpen display shows a flashing dot on the System Tray to indicate recording is going on in the background. Any application that

is active cannot record or play audio when Paper Replay is in background recording mode. If your application requires audio recording or playback, you should test if the Pulse smartpen is already in background recording mode and if so, instruct your users to turn it off before running your application. For an example of this, try the Piano application while recording. Livescribe instructs you to turn off recording before running the Piano because the piano application is an audio-centric application.

Snapback

When in background recording mode, Paper Replay can become the foreground application in several ways. When this happens, the Pulse smartpen system will deactivate the application that was in the foreground. The most obvious way is in response to action from a user. Here are some actions that can restore Paper Replay to the foreground:

- Tapping on any Fixed Print Paper Replay control. Even though some controls have no effect during recording, tapping on them brings Paper Replay to the foreground.
- Tapping on a Fixed Print area that is associated with Paper Replay but not assigned to a particular button will bring Paper Replay back to the foreground.
- Doing any other action that would normally start Paper Replay, such as tapping on a session, or launching Paper Replay from the Nav Plus.
- Writing on Open Paper while the current foreground application is not expecting Open Paper input. Examples are Fixed Print Calculator at any time, since it never takes Open Paper input, or Piano after the user has created keyboard and buttons because it is not expecting any Open Paper input at that point.

Paper Replay in background recording mode automatically returns to the foreground if the current application does not receive input from the user for five seconds. This feature is *Snapback*. For example, if the Calculator application is the current foreground application and the user pauses for five seconds without providing input, Paper Replay snaps back to be the foreground application. Snapback will deactivate the application that was in the foreground.

While Paper Replay is recording in the background, it does not receive any new strokes made by the user, as those belong to the current foreground application. Snapback is implemented to protect the user from accidentally remaining in

background recording when they believe that Paper Replay is active in the foreground and is capturing and linking their strokes to their audio.

Dynamic Active Regions

Dynamic Active regions are user-created areas on open paper pages that are saved by the application and which have ongoing functions. For example, an application may ask a user to create a button by drawing or writing a word. The user draws the button, and the application saves the bounding rectangle as a dynamic active region. When the user later taps in that region, the specific function associated with that region is triggered.

Another example of dynamic active regions is when a user writes something as input for an application. This could be a word to be translated, a mathematical expression for calculation, or a number written as a variable or setting (such as how many dice to roll).

Wherever it makes sense and could be desirable to the user, the application should ensure these regions remain active, even after the application is deactivated or destroyed. Keeping these regions active ensures that tapping on them later triggers the appropriate function in the application. For example, an application that does translation or calculation, should repeat the same function performed when the information was first written. This allows users to quickly get back to look-ups or calculations they already performed. The application should save the regions should across application launches, so that any time a user returns to them, they retain their function and value.

Shaping Dynamic Active Regions

In most cases, dynamic active regions created on Open Paper should correspond to the area written on by the user. It is usually acceptable to create the active region as a rectangular bounding area around what is written/drawn by the user. In some cases (such as when the user draws a large diagonal line) the shaping should employ polygons or some other way to create regions more closely corresponding to exactly

what is drawn. The goal is for ease of use, so that users can clearly see which areas of their page are mapped to applications or functions. In most cases, the application should not create dynamically active regions on Open Paper where the user has not written or drawn.

Activating Functions

When a user taps on a dynamic active region, the application that owns that region will launch. This is the default behavior of using dynamic active regions on Open Paper.

In general, if a user has drawn a dynamic region, the user's expectation is that when tapping that region at a later time will launch the application and perform the function associated with that region. For example, if a user taps on the "Deal" button of Video Poker, the application will launch and then deal a new hand.

In some cases, the dynamic region is associated with a function that is not actionable at the time. For example, when Video Poker is not active, and a user taps on a pre-drawn "hold" button, the application launches. However, there is no active hand, and therefore, nothing to hold. In this case, the hold function is not actionable. Video Poker handles this situation as follows. Your penlets should follow a similar approach:

- Displays a helpful message, such as "First tap the DEAL button to deal a hand"
- Plays the Action not available audio punctuation mark
- Positions the application in the main application menu.

Livescribe Standard Controls

The Livescribe Standard Controls, such as the Paper Replay controls or the Settings controls can be used in a Fixed-Print application. For information on how to include them in your application, see "Livescribe Standard Controls" in *Developing Paper Products*. The Platform SDK includes the graphics for these controls, so you can make them part of your Fixed-Print paper product.

Don't Repurpose Standard Controls

Smartpen applications should not, however, use these graphics and assign them different functionality. For instance, a Nav Plus graphic should always behave the way users expect them to behave. In short, smartpen applications should not repurpose the existing Livescribe Standard Controls.